Control Engineering INDEX

VOLUME 12 . . . JANUARY–DECEMBER 1965

A

Accelerometers

Accelerometer scribes vector-force signatures. A. Castle.....Mar. 105
Choices in preflight checking of gyros and accelerometers. H. A. Dinter Jr.....Oct. 75
Gimballed switch signals fractional g's. R. A. Randall.....Apr. 119
Surface tension closes weightlessness switch. R. P. Stromberg.....Dec. 95

Actuators

Hydraulic digital actuator. Delmege & Tremblay.....Feb. 69
Integrated pulses show motor speed fluctuations. Nitchie & Seith..Oct. 111
Projections in control equipment:
Dc motor drives.....Jan. 108
Ac adjustable speed drives....Jan. 110
Stepping motors.....Jan. 111
Process control valve actuators Jan. 112
Variable frequency supply powers induction traction motor. Nailen & Jorgensen.....June 101

Air traffic control

Air traffic men compare control notes (NF) R. L. Aronson.....Dec. 85
Control users pinpoint the potentials: Air transport.....Jan. 88

Aircraft

Air traffic men compare control notes (NF) R. L. Aronson.....Dec. 85
Aircraft troubles digitally analyzed (WN).....June 26
Artificial feel for servo-boosted manual controls. R. M. Johnson..Mar. 67
Control users pinpoint the potentials: Aircraft.....Jan. 79
First system certificated for automatic landings (WN).....Apr. 25
Light rays track 'copter blades. M. Rehder.....Sept. 141
Simulators abound at Langley (NF) R. L. Aronson.....Oct. 105

Analysis instruments

Cryogenic instrumentation. A. W. Angerhofer II.....Nov. 77
Octane quality comparator directs on-line blender. E. S. Ida & others July 80
Projections in control equipment: Measurement.....Jan. 116

Automatic warehousing

Projections in control equipment: Automatic materials handling.Jan. 132
Tape-driven display shows order-picker the way. H. J. Kuschnerus May 109

B

Boiler control

For successful computing control . . . start simple. H. S. Drewry..Aug. 76
Octane quality comparator directs on-line blender. E. S. Ida & others July 80

C

Checkout, automatic

Adaptable checkout system fits changing production. Harting & Coulter.....Sept. 126
Aircraft troubles digitally analyzed (WN).....June 26
Choices in preflight checking of gyros and accelerometers. H. A. Dinter Jr.....Oct. 75

Circuits

Analyzing proportional fluid amplifier circuits. Belsterling & Tsui Aug. 87
A fast and accurate analog multiplier. R. W. Cope.....July 87
Field-effect transistors—simple switches for analog signals. D. E. Rea.....July 66
How to compensate temperature loops in environmental control. J. C. Donovan.....Dec. 55
How to design a compensating bridge. A. J. Baracz.....Mar. 81
1 SCR converts 3 phase to DC. Michel Mamon.....June 79
Summing network design using conductance method. J. R. McDermott.....May 102
10 circuits for differentiation on analog computers. Fairchild & Krovetz Feb. 65
A transient analysis method for unbalanced bridge circuits. J. C. Donovan.....Apr. 114

Coding

ASCII: a better NC code for the metalworking industry?
Yes, says E. H. Clamons....May 94
"Definitely not—it's not needed or wanted." EIA Committee TR-31 June 57
"Yes—it's best in the long run." ASA Subcommittee X3.2....June 58
"Not now—let's clean up the existing standards first." Frank Chudoba.....June 59
"Yes, now—before a generation of NC machines are built." E. F. Carlberg.....June 59
"Please make up your minds," the Europeans say. Derek Barlow June 60
Low-order or high-order? Which bit first? E. H. Clamons.....Aug. 102

Company profiles

Informatics, Inc. makes software a growth tool (WN).....Jan. 34
ITT makes big plans for new Controls Group (WN).....Mar. 35
The Rucker Co. thrives on custom systems (WN).....Feb. 126

Compensation

Compensating pulse-data servos. D. J. Gawlowicz & others.....June 61
Designing servos for large-signal stability. Robert Acker.....May 71
How to compensate temperature loops in environmental control. J. C. Donovan.....Dec. 55

Components

A balance factor for pressure-reducing valves. David Quentzel...May 97
Cascaded piston units form universal fluid logic element. Togino & Inoue.....May 78
How solid state synchros fit in servo-systems. Joseph Carlstein....Sept. 99
Novel Navy component may compute alone (WN).....Feb. 24
Projections in control equipment Jan. 103
What you should know about IEC 158-1. G. W. Neumann.....Feb. 72
Where's the profit in fluid amplifiers? (IP).....July 57

Computers (see also Information Systems)

Analog
A fast and accurate analog multiplier. R. W. Cope.....July 87
Projections in control equipment: Analog computers.....Jan. 124
Simulators abound at Langley (NF) R. L. Aronson.....Oct. 105
10 circuits for differentiation on analog computers. Fairchild & Krovetz.....Feb. 65

Digital
Air traffic men compare control notes (NF) R. L. Aronson.Dec. 85
Clear track for on-line railroad controls—New York Central RR (NF) R. L. Aronson..June 95
Computers widely owned, many users plan expansion (IP).Apr. 67
Process computer scorecard updated (IP).....Mar. 57
Projections in control equipment: Digital computers.....Jan. 121
Scientific and business users close the computer loop (NF) R. L. Aronson.....Sept. 133
Shrinking the man-computer interface. W. F. Hubbarth.....Aug. 63
Simulators abound at Langley (NF) R. L. Aronson.....Oct. 105
Specifying a message-switching computer. J. F. Holmes...Feb. 89
A survey of crt display consoles. H. S. Corbin.....Dec. 77
Users converse with computers (WN).....Mar. 20

Special purpose
Analog computer cuts billets. Waldman & Grew.....July 75
Digital computer tells rallyists go or no go. Boswell & Cummings Nov. 119
Resultant computer "moors" ships. Shatto & Dozier.....Apr. 117

Computing control

Adaptive control by plant identification. W. V. Kershow.....Sept. 103
Backup methods for DDC. C. M. Cundall.....Apr. 98
Bunker-Ramo dropping process control computers (WN).....June 22
Burns Harbor steel plant sets controls (WN).....Feb. 19
Controlling megawatts in steelmaking. J. Tippett & others.....June 68
DDC with an analog look. F. M. Ryan.....Dec. 68
For successful computing control . . . start simple. H. S. Drewry...Aug. 76
GE buys a license but Westinghouse sues Hughes (WN).....Apr. 24
Hughes answers Westinghouse in controls patent suit.....July 91
Hughes in cement co. suit and TRW sues Hughes (WN).....Dec. 19
Hughes-owned patent looms large in process industries (WN)....Mar. 21
Hughes-Westinghouse suit: allege patent infringement by 36 (WN) Sept. 22
Merge process control, work scheduling, inventory handling (WN) Nov. 18
Practical optimizing system. J. M. Nightingale.....Nov. 93
Projections in control equipment: Direct digital control.....Jan. 119

Control Engineering INDEX

VOLUME 12 . . . JANUARY–DECEMBER 1965

A

Accelerometers

Accelerometer scribes vector-force signatures. A. Castle.....Mar. 105
Choices in preflight checking of gyros and accelerometers. H. A. Dinter Jr.....Oct. 75
Gimballed switch signals fractional g's. R. A. Randall.....Apr. 119
Surface tension closes weightlessness switch. R. P. Stromberg.....Dec. 95

Actuators

Hydraulic digital actuator. Delmege & Tremblay.....Feb. 69
Integrated pulses show motor speed fluctuations. Nitchie & Seith..Oct. 111
Projections in control equipment:
Dc motor drives.....Jan. 108
Ac adjustable speed drives....Jan. 110
Stepping motors.....Jan. 111
Process control valve actuators Jan. 112
Variable frequency supply powers induction traction motor. Nailen & Jorgensen.....June 101

Air traffic control

Air traffic men compare control notes (NF) R. L. Aronson.....Dec. 85
Control users pinpoint the potentials: Air transport.....Jan. 88

Aircraft

Air traffic men compare control notes (NF) R. L. Aronson.....Dec. 85
Aircraft troubles digitally analyzed (WN).....June 26
Artificial feel for servo-boosted manual controls. R. M. Johnson..Mar. 67
Control users pinpoint the potentials: Aircraft.....Jan. 79
First system certificated for automatic landings (WN).....Apr. 25
Light rays track 'copter blades. M. Rehder.....Sept. 141
Simulators abound at Langley (NF) R. L. Aronson.....Oct. 105

Analysis instruments

Cryogenic instrumentation. A. W. Angerhofer II.....Nov. 77
Octane quality comparator directs on-line blender. E. S. Ida & others July 80
Projections in control equipment: Measurement.....Jan. 116

Automatic warehousing

Projections in control equipment: Automatic materials handling.Jan. 132
Tape-driven display shows order-picker the way. H. J. Kuschnerus May 109

B

Boiler control

For successful computing control . . . start simple. H. S. Drewry..Aug. 76
Octane quality comparator directs on-line blender. E. S. Ida & others July 80

C

Checkout, automatic

Adaptable checkout system fits changing production. Harting & Coulter.....Sept. 126
Aircraft troubles digitally analyzed (WN).....June 26
Choices in preflight checking of gyros and accelerometers. H. A. Dinter Jr.....Oct. 75

Circuits

Analyzing proportional fluid amplifier circuits. Belsterling & Tsui Aug. 87
A fast and accurate analog multiplier. R. W. Cope.....July 87
Field-effect transistors—simple switches for analog signals. D. E. Rea.....July 66
How to compensate temperature loops in environmental control. J. C. Donovan.....Dec. 55
How to design a compensating bridge. A. J. Baracz.....Mar. 81
1 SCR converts 3 phase to DC. Michel Mamon.....June 79
Summing network design using conductance method. J. R. McDermott.....May 102
10 circuits for differentiation on analog computers. Fairchild & Krovetz Feb. 65
A transient analysis method for unbalanced bridge circuits. J. C. Donovan.....Apr. 114

Coding

ASCII: a better NC code for the metalworking industry?
Yes, says E. H. Clamons....May 94
"Definitely not—it's not needed or wanted." EIA Committee TR-31 June 57
"Yes—it's best in the long run." ASA Subcommittee X3.2....June 58
"Not now—let's clean up the existing standards first." Frank Chudoba.....June 59
"Yes, now—before a generation of NC machines are built." E. F. Carlberg.....June 59
"Please make up your minds," the Europeans say. Derek Barlow June 60
Low-order or high-order? Which bit first? E. H. Clamons.....Aug. 102

Company profiles

Informatics, Inc. makes software a growth tool (WN).....Jan. 34
ITT makes big plans for new Controls Group (WN).....Mar. 35
The Rucker Co. thrives on custom systems (WN).....Feb. 126

Compensation

Compensating pulse-data servos. D. J. Gawlowicz & others.....June 61
Designing servos for large-signal stability. Robert Acker.....May 71
How to compensate temperature loops in environmental control. J. C. Donovan.....Dec. 55

Components

A balance factor for pressure-reducing valves. David Quentzel...May 97
Cascaded piston units form universal fluid logic element. Togino & Inoue.....May 78
How solid state synchros fit in servo-systems. Joseph Carlstein....Sept. 99
Novel Navy component may compute alone (WN).....Feb. 24
Projections in control equipment Jan. 103
What you should know about IEC 158-1. G. W. Neumann.....Feb. 72
Where's the profit in fluid amplifiers? (IP).....July 57

Computers (see also Information Systems)

Analog
A fast and accurate analog multiplier. R. W. Cope.....July 87
Projections in control equipment: Analog computers.....Jan. 124
Simulators abound at Langley (NF) R. L. Aronson.....Oct. 105
10 circuits for differentiation on analog computers. Fairchild & Krovetz.....Feb. 65

Digital
Air traffic men compare control notes (NF) R. L. Aronson.Dec. 85
Clear track for on-line railroad controls—New York Central RR (NF) R. L. Aronson..June 95
Computers widely owned, many users plan expansion (IP).Apr. 67
Process computer scorecard updated (IP).....Mar. 57
Projections in control equipment: Digital computers.....Jan. 121
Scientific and business users close the computer loop (NF) R. L. Aronson.....Sept. 133
Shrinking the man-computer interface. W. F. Hubbarth.....Aug. 63
Simulators abound at Langley (NF) R. L. Aronson.....Oct. 105
Specifying a message-switching computer. J. F. Holmes...Feb. 89
A survey of crt display consoles. H. S. Corbin.....Dec. 77
Users converse with computers (WN).....Mar. 20

Special purpose
Analog computer cuts billets. Waldman & Grew.....July 75
Digital computer tells rallyists go or no go. Boswell & Cummings Nov. 119
Resultant computer "moors" ships. Shatto & Dozier.....Apr. 117

Computing control

Adaptive control by plant identification. W. V. Kershow.....Sept. 103
Backup methods for DDC. C. M. Cundall.....Apr. 98
Bunker-Ramo dropping process control computers (WN).....June 22
Burns Harbor steel plant sets controls (WN).....Feb. 19
Controlling megawatts in steelmaking. J. Tippett & others.....June 68
DDC with an analog look. F. M. Ryan.....Dec. 68
For successful computing control . . . start simple. H. S. Drewry...Aug. 76
GE buys a license but Westinghouse sues Hughes (WN).....Apr. 24
Hughes answers Westinghouse in controls patent suit.....July 91
Hughes in cement co. suit and TRW sues Hughes (WN).....Dec. 19
Hughes-owned patent looms large in process industries (WN)....Mar. 21
Hughes-Westinghouse suit: allege patent infringement by 36 (WN) Sept. 22
Merge process control, work scheduling, inventory handling (WN) Nov. 18
Practical optimizing system. J. M. Nightingale.....Nov. 93
Projections in control equipment: Direct digital control.....Jan. 119

Digital computers.....Jan. 121
Small computer runs paper mill in Britain (WN).....Apr. 38

Controllers

Adjusting controllers for a deadtime process. A. Haalman.....July 71
DDC with an analog look. F. M. Ryan.....Dec. 68
Digital control for the single loop. Mergler & Hubbard.....Feb. 61
Fast simultaneous bumpless transfer. interview with C. L. Mamzic.Aug. 97
A fluid-amplifier pneumatic controller. B. G. Bjornsen.....June 88
Make the most of time-proportional control. C. H. Loos.....May 65
Projections in control equipment: Analog process controllers...Jan. 121

Cryogenics

Cryogenic instrumentation. A. W. Angerhofer I ....Oct. 67, II Nov. 77
Predicting cryogenic thermocouple time constant. V. A. Devita...July 63
Proportional control steadies cryosurgical probe temperature. R. A. Cutt .....Mar. 103

D

Data Files (Reference sheets)

90. Second-order response . . . a simplified solution. E. H. Majewski Feb. 71
91. Signal flow graphs. S. M. Becker Mar. 89
92. Parameter sensitivity by root locus. C. H. Houpis.....Apr. 111
93. Summing network design using conductance method. J. R. McDermott .....May 102
94. Finding regulator response from modified Nichols charts. D. C. Dixon .....June 83
95. Equivalent routh array accelerates high-order analysis. J. W. Moore .....July 85
96. Check stability of third-order systems. Raymond & Harrison Aug. 94
97. Damping ratio curves in the z-plane. Silverstein & Sursi....Sept. 131
98. Finding transient descriptors graphically. Jones & Vahouny 1 Oct. 97
99. .....2 Nov. 99
100. Using dual-locus diagrams in system synthesis. P. N. Nikiforuk & D. R. Westlund.....Dec. 73

Data transmission (see also Information systems)

Interfacing data modems and processors. H. F. Najjar.....Nov. 103
Low-order or high-order? Which bit first? E. H. Clamons.....Aug. 102
Specifying a message-switching computer. J. F. Holmes.....Feb. 89

Digital servos

Compensating pulse-data servos. D. J. Gawlowicz & others.....June 61
Fluidic digital servo controls speed, position. C. K. Taft.....Dec. 49
GE buys a license but Westinghouse sues Hughes (WN).....Apr. 24
Hughes answers Westinghouse in controls patent suit.....July 91
Hughes-owned patent looms large in process industries (WN)....Mar. 21
Hughes-Westinghouse suit: allege patent infringement by 36 (WN) Sept. 22
Projections in control equipment: Electromechanical servos....Jan. 113
Microcircuits in controls—amid controversy, big switch starts (IP) .....June 49
NBS studies computer standards and applications (WN)...Apr. 24
Process computer scorecard (IP) Aug. 54

Digital techniques (see also information systems)

Binary signals locate film frames. Derek Barlow.....July 97
Cascaded piston units form universal fluid logic element. Togino & Inoue .....May 78
Digital control for the single loop. Mergler & Hubbard.....Feb. 61
GE buys a license but Westinghouse sues Hughes (WN).....Apr. 24
Half-adder-subtractor updates delay line. N. Prochaska.....July 97
Hughes answers Westinghouse in controls patent suit.....July 91
Hughes-Westinghouse suit: allege patent infringement by 36 (WN) Sept. 22
Hydraulic digital actuator. Delmege & Tremblay.....Feb. 69
Level gage senses with binary connected coils. J. D. Kelly.....Oct. 109
Piston fluid logic sequences gas dispensing. Ito & Togino.....Sept. 139
Projections in control equipment: Stepping motors.....Jan. 111

Digital trainers

What's available in digital and logic trainers. M. J. Kashman....Apr. 73

Digital transducers

Ball bearing beefs up flowmeter. H. E. Minkin.....Mar. 105
Pulsation errors in turbine flowmeters. A. Haalman.....May 89
Simple transducer gives press position readout. B. Bendicsen.....Nov. 117

Direct digital control

Backup methods for DDC. C. M. Cundall .....Apr. 98
DDC spreads out in Britain (WN) June 36
DDC with an analog look. F. M. Ryan .....Dec. 68
Digital control for the single loop. Mergler & Hubbard.....Feb. 61
Projections in control equipment: Direct digital control.....Jan. 119

Display of data (see also Information systems)

Binary signals locate film frames. Derek Barlow.....July 97
"Name communication" speeds plant data display. J. V. Werme....Dec. 96
Pictorial display streamlines control center. J. Arima.....Sept. 142
Projections in control equipment: Displays .....Jan. 125
A survey of crt display consoles. H. S. Corbin.....Dec. 77
Tape-driven display shows order-picker the way. H. J. Kuschnerus May 109

E

Editorials

An instant in progress.....Jan. 65
Can controls be not controls?..Mar. 65
The common denominator....Sept. 93
Control enforcement: a money maker Apr. 71
Control is people-limited.....Aug. 61
Costly ornaments.....June 55
Cross-fertilization applied.....July 61
Discrete piece manufacturing ripe for more control.....Oct. 65
Expertise requires practice.....Dec. 47
Proposed: cooperative equipment evaluation .....May 63
A sense of acceptance.....Nov. 71
Who cares what it costs!.....Feb. 59

Electronics

Field-effect transistors—simpler switches for analog signals. D. E. Rea .....July 66
How to design a compensating bridge. A. J. Baracz.....Mar. 81
NASA electronics center wades into controls (WN).....Nov. 21
1 SCR converts 3 phase to DC. Michel Mamon.....June 79
Projections in control equipment: Electronics .....Jan. 129
6 ways to measure phase angle. Robert Staffin.....Oct. 78
Summing network design using conductance method. J. R. McDermott .....May 102
10 circuits for differentiation on analog computers. Fairchild & Krovetz Feb. 65

Engineers

Big potential for two-year men, if—(IP) .....Feb. 55
Education: control has its impact. J. G. Truxal.....Jan. 71
High schools tackle instrument training (WN).....Oct. 20
Societies: form and group for progress. Harold Chestnut.....Jan. 73
What's available in digital and logic trainers. M. J. Kashman.....Apr. 73

Error analysis

Designer's Workbook 4. Fine points about errors in geartrain servos. A. F. Clarke Jr.....Aug. 67
Pulsation errors in turbine flowmeters. A. Haalman.....May 89
Taking instantaneous errors out of constant-rate servo drives. Ira Cochin .....Apr. 93
A transient analysis method for unbalanced bridge circuits. J. C. Donovan .....Apr. 114

F

Flight instrumentation

Artificial feel for servo-boosted manual controls. R. M. Johnson..Mar. 67
Choices in preflight checking of gyros and accelerometers. H. A. Dinter Jr. .....Oct. 75
Designer's Workbook 4. Fine points about errors in geartrain servos. A. F. Clarke Jr.....Aug. 67
First [illegible]em certificated for automa[illegible]dings (WN).....Apr. 25

Flow, fluid

Ball bearing beefs up flowmeter. H. E. Minkin.....Mar. 105
Cryogenic instrumentation. A. W. Angerhofer II.....Nov. 77
Photoelastic effect shows fluid device performance. Scott & Peoples July 98
Piston fluid logic sequences gas dispensing. Ito & Togino.....Sept. 139
Pulsation errors in turbine flowmeters. A. Haalman.....May 89
Sphere in loop checks flowmeters. F. A. Fergusson.....Aug. 110

Fluidics

Analyzing proportional fluid ampli-

fier circuits. Belsterling & Tsui Aug. 87
Fluid amplifier helps patients breathe. H. H. Straub....Apr. 120
A fluid-amplifier pneumatic controller. B. G. Bjornsen....June 88
Fluid amps run locomotive (WN) July 23
Fluidic digital servo controls speed, position. C. K. Taft....Dec. 49
Photoelastic effect shows fluid device performance. Scott & Peoples July 98
Projections in control equipment: Hydraulics and pneumatics...Jan. 127
Where's the profit in fluid amplifiers? (IP) ....July 57

Foreign control

AACC group attends "Russian JACC" (WN)....Dec. 18
Anglo-French group aims at big computers (WN)....Sept. 32
British NC sales up sharply (WN) Aug. 35
Cascaded piston units form universal fluid logic element. Togino & Inoue May 78
Comecon Exhibit: East bloc spreads its wares (WN)....Aug. 26
DDC spreads out in Britain (WN) June 36
Dutch put instruments through the wringer (WN)....May 23
Europe: systems grow bigger in lively market. D. H. Barlow....Jan. 95
International meeting eyes miniature control components (WN)...Dec. 21
Japan: a control youngster but maturing fast. Kazuto Togino...Jan. 99
Japanese set rail seat system (WN) Aug. 24
Russia: controls pushed as key to progress ....Jan. 101
Russian computer management controls set, govt. says (WN)....Apr. 30
Small computer models plant in Britain (WN)....Feb. 32
Small computer runs paper mill in Britain (WN)....Apr. 38
Steel controls get more sophisticated (WN) ....July 30
Vacuum photocathode speeds electro-optics—U.K. Atomic Energy Authority (WN)....Jan. 32

G

Graphic analysis

Check stability of third-order systems. Raymond & Harrison..Aug. 94
Damping ratio curves in the z-plane. Silverstein & Sursi....Sept. 131
Finding regulator response from modified Nichols charts. D. C. Dixon ....June 83
Finding transient descriptors graphically. Jones & Vahouny.1 Oct 97, 2 Nov. 99
How to check linear systems stability. C. H. Hoffman
III. Locating the roots graphically June 71
IV. Determining relative stability Oct. 85
Parameter sensitivity by root locus. C. H. Houpis....Apr. 111
Second-order response . . . a simplified solution. E. H. Majewski.Feb. 71
Transparent overlay speeds graph interpolation. D. Fetterman..Nov. 117
Using dual-locus diagrams in system synthesis. P. N. Nikiforuk & D. R. Westlund....Dec. 73

Gyros

Choices in preflight checking of gyros and accelerometers. H. A. Dinter Jr. ....Oct. 75
Temperature-stable rate gyros damps magnetically. Alphons Fraenkel June 103

H

Hydraulics

Designer's Workbook 3. Positioning with hydraulic cylinders. J. Marshall & others....Mar. 91
Mating machine tools and hydraulic servos—it's a 2-way street. J. M. Rhoades ....Apr. 89
Projections in control equipment: Hydraulics and pneumatics...Jan. 127
Unusual servovalve has balls for spool. R. D. Gustafson....Dec. 95

I

Industrial control

Aerospace companies branch out (WN) ....Oct. 22
Analog computer cuts billets. Waldman & Grew....July 75
Automakers focus on optics (WN) Jan. 21
Automatic film reader reports weld flaws. Szabo & Eppler....May 111
Burns Harbor steel plant sets controls (WN)....Feb. 19
Control users pinpoint the potentials Jan. 77
Integrated pulses show motor speed fluctuations. Nitchie & Seith..Oct. 111
Optical systems—answer to precise positioning. E. G. Loewen...Sept. 118
Plastic shutters help pinhole spotting. Masson & Blickley....Feb. 95
Process computer scorecard (IP) Aug. 54
Process computer scorecard updated (IP) ....Mar. 57
Stress machine grades lumber. Ray Loofburrow ....July 95
Tape-driven display shows order-picker the way. H. J. Kuschnerus May 109
Tape-driven photohead makes PC-board plates. R. C. Kielpinski June 99
Versatile logic module. B. W. Lee Oct. 92
Weight-balance servo lowers load into a hole. Joseph Hagel....Oct. 111
What you should know about IEC 158-1. G. W. Heumann....Feb. 72

Industry's pulse

Big potential for two-year men, if— Feb. 55
Computers widely owned, many users plan expansion....Apr. 67
Microcircuits in controls—amid controversy, big switch starts....June 49
Process computer scorecard....Aug. 54
Process computer scorecard updated Mar. 57
Steel spending plans boosted sharply Nov. 65
Where's the profit in fluid amplifiers? July 57

Information systems

Air traffic men compare control notes (NF) R. L. Aronson....Dec. 85
Clear track for on-line railroad controls—New York Central RR (NF) R. L. Aronson....June 95
Control users pinpoint the potentials: Commerce ....Jan. 89
Information protection: Why? How? E. E. Sarafin....May 105
Interfacing data modems and processors. H. F. Najjar....Nov. 103
Low-order or high-order? Which bit first? E. H. Clamons....Aug. 102
Merge process control, work scheduling, inventory handling (WN) Nov. 18
"Name communication" speeds plant data display. J. V. Werme....Dec. 96
Scientific and business users close the computer loop (NF) R. L. Aronson ....Sept. 133
Specifying a message-switching computer. J. F. Holmes....Feb. 89
A survey of crt display consoles. H. S. Corbin....Dec. 77
Tape-driven display shows order-picker the way. H. J. Kuschnerus May 109

Inspection, automatic

Automatic film reader reports weld flaws. Szabo & Eppler....May 111

Instrumentation

Big potential for two-year men, if— (IP) ....Feb. 55
Choices in preflight checking of gyros and accelerometers. H. A. Dinter Jr. ....Oct. 75
Cryogenic instrumentation. A. W. Angerhofer....I Oct 67, II Nov. 77
Dutch put instruments through the wringer (WN)....May 23
Hot, concentrated solutions pose density sensing problem. J. Ralph Nov. 115
Light rays track 'copter blades. M. Rehder ....Sept. 141
Plane-level gives electrical output. E. L. Bryant....May 112
Surface tension closes weightlessness switch. R. P. Stromberg....Dec. 95
Two ways of gaging tank level
Level gage senses with binary connected coils. J. D. Kelly...Oct. 109
Level gage senses with twin transmission line....Oct. 109

Integrated circuits
(see Solid state devices)

L

Level

Cryogenic instrumentation. A. W. Angerhofer I....Oct. 67
Two ways of gaging tank level
Level gage senses with binary connected coils. J. D. Kelly....Oct. 109
Level gage senses with twin transmission line....Oct. 109

Light (see Optical systems)

Logic

Cascaded piston units form universal fluid logic elment. Togino & Inoue May 78
Half-adder-subtractor updates delay line. N. Prochaska....July 97
Piston fluid logic sequences gas dispensing. Ito & Togino....Sept. 139
Projections in control equipment: Low-level switching....Jan. 106
Translating logic to circuits. P. M. Kintner ....Nov. 86
Versatile logic module. B. W. Lee Oct. 92

Logic trainers (see Digital trainers)

M

Machine control

ASCII: a better NC code for the metalworking industry?
Yes, says E. H. Clamons....May 94
"Definitely not—it's not needed or wanted." EIA Committee TR-31 June 57
"Yes—it's best in the long run." ASA Subcommittee X3-2..June 58
"Not now—let's clean up the existing standards first." Frank Chudoba .....June 59
"Yes, now—before a new generation of NC machines are built." E. F. Carlberg.....June 59
"Please make up your minds," the Europeans say. Derek Barlow June 60
Automakers focus on optics (WN) Jan. 21
Control users pinpoint the potentials: Discrete-piece manufacturing. Jan. 85
Designer's Workbook 3. Positioning with hydraulic cylinders. J. Marshall & others.....Mar. 91
A feast of control at the three big shows: Machine Tool Show, Production Engineering Show, International Machine Tool Show (NF) B. M. Blake.....Nov. 109
Frequency signals direct contouring machine. G. E. Culy.....Dec. 93
Half-adder-subtractor updates delay line. N. Prochaska.....July 97
Mating machine tools and hydraulic servos—it's a 2-way street. J. M. Rhoades .....Apr. 89
Numerical control in '65 and tomorrow. B. M. Blake.....Sept. 95
Off-line gaging sets tool's position. G. Stadler.....Mar. 106
Optical systems—answer to precise positioning. E. G. Loewen...Sept. 118
Photogrammetry patented: diemaking by camera (WN).....Sept. 21
Projections in control equipment: Numerical control.....Jan. 130
Reducing transient strains in elastic-strip processes. W. C. Carter. Mar. 84
Simple transducer gives press position readout. B. Bendicsen.....Nov. 117
Tape driven photohead makes PC-board plates. R. C. Kielpinski. June 99
Versatile logic module. B. W. Lee Oct. 92

Maintenance

Instrument Maintenance methods—a roundup of user approaches. F. M. Ryan .....Sept. 111
Process Control practices excite interest. F. M. Ryan.....Mar. 97

Man-machine systems

Air traffic men compare control notes (NF) R. L. Aronson.....Dec. 85
Artificial feel for servo-boosted manual controls. R. M. Johnson..Mar. 67
Projections in control equipment: Displays .....Jan. 125
Scientific and business users close the computer loop (NF) R. L. Aronson .....Sept. 133
Shrinking the man-computer interface. W. F. Hubbarth.....Aug. 63
Users converse with computers (WN) .....Mar. 20

Manufacturing

Control users pinpoint the potentials: Discrete-piece manufacturing Jan. 85
Photogrammetry patented: diemaking by camera (WN).....Sept. 21

Marketing

Aerospace companies branch out (WN) .....Oct. 22
The boom is just beginning. Keith Aldrich .....Jan. 67
Bunker-Ramo dropping process control computers (WN).....June 22
Computers widely owned, many users plan expansion (IP)...Apr. 67
Europe: systems grow bigger in lively market. D. H. Barlow..Jan. 95
Japan: a control youngster but maturing fast. Kazuto Togino.. Jan. 99
Microcircuits in controls—amid controversy, big switch starts (IP) June 49
Process computer scorecard (IP) Aug. 54
Process computer scorecard updated (IP) .....Mar. 57
Steel spending plans boosted sharply (IP) .....Nov. 65
Where's the profit in fluid amplifiers? (IP) .....July 57

Materials handling

Projections in control equipment: Automatic materials handling. Jan. 132
Weight-balance servo lowers load into a hole. Joseph Hagel.....Oct. 111

Mathematical analysis (see also Graphic analysis)

Equivalent routh array accelerates high-order analysis. J. W. Moore July 85
Finding regulator response from modified Nichols charts. D. C. Dixon .....June 83
How to check linear systems stability. C. H. Hoffman
II. Locating the roots by algebra Feb. 84
III. Locating the roots graphically June 71
IV. Determining relative stability Oct. 85
Parameter sensitivity by root locus. C. H. Houpis.....Apr. 111
Second-order response . . . a simplified solution. E. H. Majewski. Feb. 71
Signal flow graphs. S. M. Becker Mar. 89
A transient analysis method for unbalanced bridge circuits. J. C. Donovan .....Apr. 114
Using dual-locus diagrams in system synthesis. P. N. Nikiforuk & D. R. Westlund.....Dec. 73

Measuring

Accelerometer scribes vector-force signatures. A. Castle.....Mar. 105
Calibrating nuclear gages for slurry density. R. A. Denning.....Feb. 79
Cryogenic instrumentation. A. W. Angerhofer....I Oct. 67, II Nov. 77
Gimballed switch signals fractional g's. R. A. Randall.....Apr. 119
Hot, concentrated solutions pose density sensing problem. J. Ralph Nov. 115
Integrated pulses show motor speed fluctuations. Nitchie & Seith..Oct. 111
Light rays track 'copter blades. M. Rehder .....Sept. 141
Measurement: R&D looks to future. W. A. Wildhack.....Jan. 75
Obtain process dynamics by pulse testing. J. W. Banham Jr.....Apr. 83
Octane quality comparator directs on-line blender. E. S. Ida & others July 80
Off-line gaging sets tool's position. G. Stadler.....Mar. 106
Optical systems—answer to precise positioning. E. G. Loewen...Sept. 118
Photoelastic effect shows fluid device performance. Scott & Peoples. July 98
Plane-level gives electrical output. E. L. Bryant.....May 112
Predicting cryogenic thermocouple time constant. V. A. Devita..July 63
Projections in control equipment: Measurement .....Jan. 116
Sensor developments.....Jan. 118
Pulsation errors in turbine flowmeters. A. Haalman.....May 89
Reflected pulses measure stripline impedance. J. R. Pivnichny..Aug. 107
6 ways to measure phase angle. Robert Staffin.....Oct. 78
Sphere in loop checks flowmeters. F. A. Fergusson.....Aug. 110
A transient analysis method for unbalanced bridge circuits. J. C. Donovan .....Apr. 114
Two ways of gaging tank level
Lence gage senses with binary connected coils. J. D. Kelley. Oct. 109
Level gage senses with twin transmission line.....Oct. 109

Medical applications

Fluid amplifier helps patients breathe. H. H. Straub.....Apr. 120
Proportional control steadies cryosurgical probe temperature. R. A. Cutt .....Mar. 103
Silly putty absorbs heartbeats. C. E. Kramer .....Feb. 98
Syringe controller times injection to heartbeats. R. L. Skinner....Aug. 109

Meetings, news reports

AACC group attends "Russian JACC" (WN).....Dec. 18
A feast of control at the three big shows:
Machine Tool Show, Production Engineering Show, International Machine Tool Show (NF) B. M. Blake.....Nov. 109
International Conference on Industrial Electronics and Control Instrumentation-down-to-earth control meeting draws few (WN) Oct. 23
International meeting eyes miniature control components (WN)...Dec. 21
JACC 1965: systems expand but programming is bottleneck (WN) Aug. 23

Metals processing and finishing

Analog computer cuts billets. Waldman & Grew.....July 75
Better control urged for continuous casting (WN).....May 22
Burns Harbor steel plant sets controls (WN) .....Feb. 19
Control users pinpoint the potentials: Steel .....Jan. 91
Controlling megawatts in steelmaking. J. Tippett & others.....June 68
Merge process control, work scheduling, inventory handling (WN) Nov. 18
Plastic shutters help pinhole spotting. Masson & Blickley.....Feb. 95
Steel controls get more sophisticated (WN) .....July 30

Steel spending plans boosted sharply (IP) ..... Nov. 65

Microcircuits (see Solid state devices)

Missiles

Control users pinpoint the potentials: Missiles ..... Jan. 81

Gimballed switch signals fractional g's. R. A. Randall..... Apr. 119

Temperature-stable rate gyro damps magnetically. Alphons Fraenkel June 103

Modulators

1 SCR converts 3 phase to DC. Michel Mamon..... June 79

Motors, electrical (see Actuators)

Multipliers

A fast and accurate analog multiplier. R. W. Cope..... July 87

N

Networks

Compensating

Compensating pulse-data servos. D. J. Gawlowicz & others.. June 61

How to compensate temperature loops in environmental control. J. C. Donovan..... Dec. 55

How to design a compensating bridge. A. J. Baracz..... Mar. 81

Nuclear instrumentation

Calibrating nuclear gages for slurry density. R. A. Denning..... Feb. 79

Numerical control (see Machine control)

O

On-off control systems

Make the most of time-proportional control. C. H. Loos..... May 65

Modulating bang-bang attitude controls. Melcher & Otten..... Nov. 73

Projections in control equipment: Mechanical drives..... Jan. 113

Optical systems

Optical systems—answer to precise positioning. E. G. Loewen... Sept. 118

Rate servo keeps TV picture clear. Juan de la Cierva..... May 112

Optimizing control

Adaptive control by plant identification. W. V. Kershow..... Sept. 103

Practical optimizing system. J. M. Nightingale ..... Nov. 93

P

Papermaking

Control users pinpoint the potentials: Pulp and paper..... Jan. 93

Small computer runs paper mill in Britain (WN)..... Apr. 38

Tape makes paper coater flexible (WN) ..... Aug. 22

Patents

GE buys a license but Westinghouse sues Hughes (WN)..... Apr. 24

Hughes answers Westinghouse in controls patent suit..... July 91

Hughes in cement co. suit and TRW sues Hughes (WN)..... Dec. 19

Hughes-owned patent looms large in process industries (WN).... Mar. 21

Hughes-Westinghouse suit: allege patent in fringment by 36... Sept. 22

Personality sketches

Moore, Harry F..... Jan. 17

Vannah, William E..... Apr. 19

Wilcox, Richard H..... Mar. 17

Zadwick, Kenneth A..... Feb. 15

Pneumatics (see also Fluid amplifiers)

Cascaded piston units form universal fluid logic element. Togino & Inoue May 78

A fluid-amplifier pneumatic controller. B. G. Bjornsen..... June 88

Off-line gaging sets tool's position. G. Stadler..... Mar. 106

Piston fluid logic sequences gas dispensing. Ito & Togino..... Sept. 139

Projections in control equipment: Hydraulics and pneumatics... Jan. 127

Power generation

Control users pinpoint the potentials: Power generation..... Jan. 83

Oops, there goes a million kilowatts (WN) ..... Dec. 20

Process control

Adaptive control by plant identification. W. V. Kershow..... Sept. 103

Adjusting controllers for a deadtime process. A. Haalman..... July 71

Backup methods for DDC. C. M. Cundall ..... Apr. 98

A balance factor for pressure-reducing valves. David Quentzel... May 97

Better control urged for continuous casting (WN)..... May 22

Big potential for two-year men, if— (IP) ..... Feb. 55

Bunker-Ramo dropping process control computers (WN)..... June 22

Calibrating nuclear gages for slurry density. R. A. Denning..... Feb. 79

Control users pinpoint the potentials:

Chemical and petroleum..... Jan. 77

Power generation..... Jan. 83

Pulp and paper..... Jan. 93

Cement ..... Jan. 93

Food ..... Jan. 94

Water and waste treatment... Jan. 94

Cryogenic instrumentation. A. W. Angerhofer....I Oct. 67, II Nov. 77

DDC with an analog look. F. M. Ryan ..... Dec. 68

Digital control for the single loop. Mergler & Hubbard..... Feb. 61

Fast simultaneous bumpless transfer. interview with C. L. Mamzic. Aug. 97

For successful computing control . . . start simple. H. S. Drewry Aug. 76

GE buys a license but Westinghouse sues Hughes (WN)..... Apr. 24

Hot, concentrated solutions pose density sensing problem. J. Ralph Nov. 115

Hughes answers Westinghouse in controls patent suit..... July 91

Hughes in cement co. suit and TRW sues Hughes (WN)..... Dec. 19

Hughes-owned patent looms large in process industries (WN).... Mar. 21

Hughes-Westinghouse suit: allege patent infringement by 36 (WN) Sept. 22

Instrument maintenance methods—a round-up of user approaches. F. Ryan ..... Sept. 111

Make the most of time-proportional control. C. H. Loos..... May 65

Process computer scorecard (IP) Aug. 54

Process computer scorecard updated (IP) ..... Mar. 57

Process control practices excite interest. F. M. Ryan..... Mar. 97

Projections in control equipment:

Process control valve actuators Jan. 112

Direct digital control..... Jan. 119

Analog process controllers... Jan. 121

Reducing transient strains in elastic-strip processes. W. C. Carter. Mar. 84

Small computer runs paper mill in Britain (WN)..... Apr. 38

Tape makes paper coater flexible (WN) ..... Aug. 22

Programmed systems

Adaptable checkout system fits changing production. Harting & Coulter ..... Sept. 126

Clip-card sets curtain contour. J. R. McLay ..... Aug. 110

Projections in control equipment: Numerical control..... Jan. 130

Tape driven photohead makes PC-board plates. R. C. Kielpinski June 99

Tape makes paper coater flexible (WN) ..... Aug. 22

R

Recording (see Tape recording)

Regulators

Finding regulator response from modified Nichols charts. D. C. Dixon ..... June 83

Relays

Versatile logic module. B. W. Lee Oct. 92

What you should know about IEC 158-1. G. W. Heumann..... Feb. 72

Reliability

High-security control through redundant channels. L. A. J. Lawrence Mar. 74

Resolvers

Projections in control equipment: Electromechanical servos..... Jan. 113

Use multiple synchros in two-speed systems. C. W. Lang..... Oct. 100

Russian control

AACC group attends "Russian JACC" (WN)..... Dec. 18

Comecon Exhibit: East bloc spreads its wares (WN)..... Aug. 26

Russia: controls pushed as key to progress ..... Jan. 101

Russian computer management controls set, govt. says (WN).... Apr. 30

S

Safety

High-security control through redundant channels. L. A. J. Lawrence ..... Mar. 74

Sampled-data systems

Damping ratio curves in the z-plane. Silverstein & Sursi..... Sept. 131

Practical optimizing control. J. M. Nightingale ..... Nov. 93

Taking instantaneous errors out of constant-rate servo drives. Ira Cochin ..... Apr. 93

Sensors (see Transducers)

Servomechanisms (see also Digital servos)

Artificial feel for servo-boosted manual controls. R. M. Johnson Mar. 67

Compensating pulse-data servos. D. J. Gawlowicz & others..... June 61

Designer's Workbook

3. Positioning with hydraulic cylinders. J. Marshall & others.. Mar. 91

4. Fine points about errors in gear-train servos. A. F. Clarke Jr. Aug. 67

Designing servos for large-signal stability. Robert Acker..... May 71

Finding transient descriptors graphically. Jones & Vahouny.. Oct 97, 2 Nov. 99

How solid state synchros fit in servo-systems. Joseph Carlstein.... Sept. 99

How to design a compensating bridge. A. J. Baracz.....Mar. 81
Matching motor to load in ac power servos. A. F. Clarke, Jr.....Dec. 61
Posicast control by delayed gain. G. G. Gorbatenko.....Feb. 74
Projections in control equipment: Electromechanical servos....Jan. 113
Rate servo keeps TV picture clear. Juan de la Cierva.....May 112
Taking instantaneous errors out of constant-rate servo drives. Ira Cochin .....Apr. 93
Use multiple synchros in two-speed systems. C. W. Lang.....Oct. 100
Weight-balance servo lowers load into a hole. Joseph Hagel.....Oct. 111

Servovalves (see Valves)

Simulation

Projections in control equipment: Analog computers.....Jan. 124
Simulators abound at Langley (NF) R. L. Aronson.....Oct. 105

Slurries

Calibrating nuclear gages for slurry density. R. A. Denning.....Feb. 79

Solid state devices

Field-effect transistors—simpler switches for analog signals. D. E. Rea .....July 66
How solid state synchros fit in servo-systems. Joseph Carlstein....Sept. 99
How to design water-cooled heatsinks for SCR's. E. L. Harris Jr....Apr. 105
Microcircuits in controls—amid controversy, big switch starts (IP) June 49
Novel Navy component may compute alone (WN).....Feb. 24
1 SCR converts 3 phase to DC. Michel Mamon.....June 79
Projections in control equipment:
High-power switching.....Jan. 105
Low-level switching.....Jan. 106
Dc motor drives.....Jan. 108
Ac adjustable speed drives....Jan. 110
Electronics .....Jan. 129

Space vehicle control

Apollo ships to follow ocean-floor highway (WN).....Sept. 20
Control users pinpoint the potentials: Space vehicles.....Jan. 82
Mariner midcourse maneuver (WN) Jan. 26
Modulating bang-bang attitude controls. Melcher & Otten.....Nov. 73
NASA control efforts seen in budget (WN) .....Mar. 24
NASA electronics center wades into controls (WN).....Nov. 21
Shrinking the man-computer interface. W. F. Hubbarth.....Aug. 63
Simulators abound at Langley (NF) R. L. Aronson.....Oct. 105
Surface tension closes weightlessness switch. R. P. Stromberg.....Dec. 95

Speed control

Projections in control equipment:
Dc motor drives.....Jan. 108
Ac adjustable speed drives...Jan. 110
Mechanical drives.....Jan. 113
Variable frequency supply powers induction traction motor. Nailen & Jorgensen.....June 101

Stability

Check stability of third-order systems. Raymond & Harrison..Aug. 94
Designing servos for large-signal stability. Robert Acker.....May 71
How to check linear systems stability. C. H. Hoffman
II. Locating the roots by algebra Feb. 84
III. Locating the roots graphically June 71
IV. Determining relative stability Oct. 85
Posicast control by delayed gain. G. G. Gorbatenko.....Feb. 74
Using dual-locus diagrams in system synthesis. P. N. Nikiforuk & D. R. Westlund.....Dec. 73

Standards

ASCII: a better NC code for the metalworking industry?
Yes, says E. H. Clamons....May 94
"Definitely not—it's not needed or wanted." EIA Committee TR-31 June 57
"Yes—it's best in the long run." ASA Subcommittee X3.2..June 58
"Not now—let's clean up the existing standards first." Frank Chudoba .....June 59
"Yes, now—before a new generation of NC machines are built." E. F. Carlberg.....June 59
"Please make up your minds," the Europeans say. Derek Barlow June 60
Dutch put instruments through the wringer (WN).....May 23
NBS studies computer standards and applications (WN).....Apr. 24
Standards: still a continuing project. H. L. Mason.....Jan. 74
What's new in control standards. C. H. Gould.....Aug. 83
What you should know about IEC 158-1. G. W. Heumann.....Feb. 72

Switching techniques

Field-effect transistors—simpler switches for analog signals. D. E. Rea .....July 66
Projections in control equipment:
High-power switching.....Jan. 105
Low-level switching.....Jan. 106
Specifying a message-switching computer. J. F. Holmes.....Feb. 89

Systems

Analysis
Check stability of third-order systems. Raymond & Harrison Aug. 94
Damping ratio curves in the z-plane. Silverstein & Sursi..Sept. 131
Equivalent routh array accelerates high-order analysis. J. W. Moore July 85
Finding transient descriptors graphically. Jones & Vahouny .....1 Oct 97, 2 Nov. 99
How to check linear systems stability. C. H. Hoffman
II. Locating the roots by algebra Feb. 84
III. Locating the roots graphically .....June 71
IV. Determining relative stability .....Oct. 85
Make the most of time-proportional control. C. H. Loos..May 65
Obtain process dynamics by pulse testing. J. W. Banham Jr...Apr. 83
Parameter sensitivity by root locus. C. H. Houpis.....Apr. 111
Second-order response . . . a simplified solution. E. H. Majewski Feb. 71
Signal flow graphs. S. M. Becker Mar. 89
Design
Compensating pulse-data servos. D. J. Gawlowicz & others..June 61
Designing servos for large-signal stability. Robert Acker....May 71
High-security control through redundant channels. L. A. J. Lawrence .....Mar. 74
Matching motor to load in ac power servos. A. F. Clarke, Jr. Dec. 49
Mating machine tools and hydraulic servos—it's a 2-way street. J. M. Rhoades.....Apr. 89
Posicast control by delayed gain. G. G. Gorbatenko.....Feb. 74
Translating logic to circuits. P. M. Kintner .....Nov. 86
Specification
Projections in control equipment Jan. 103
Engineering
Adaptive control by plant identification. W. V. Kershow...Sept. 103
Backup methods for DDC. C. M. Cundall .....Apr. 98

T

Tape recording and reading (see also Information systems)

Magnetics
Frequency signals direct contouring machine. G. E. Culy...Dec. 93
Punched
ASCII: a better NC code for the metalworking industry?
Yes, says E. H. Clamons..May 94
"Definitely not—it's not needed or wanted." EIA Committee TR-31 .....June 57
"Yes—it's best in the long run." ASA Subcommittee X3.2 June 58
"Not now—let's clean up the existing standards first." Frank Chudoba.....June 59
"Yes, now—before a new generation of NC machines are built." E. F. Carlberg...June 59
"Please make up your minds," the Europeans say. Derek Barlow .....June 60
Tape cartridge stores and reads. D. C. Austin.....Feb. 98
Other
Burnt spots boost tape density. R. K. Agarwal.....Feb. 97

Temperature

Cryogenic instrumentation. A. W. Angerhofer I.....Oct. 67
How to compensate temperature loops in environmental control. J. C. Donovan .....Dec. 55
How to design water-cooled heatsinks for SCR's. E. L. Harris Jr....Apr. 105
Predicting cryogenic thermocouple time constant. V. A. Devita...July 63
Proportional control steadies cryosurgical probe temperature. R. A. Cutt .....Mar. 103

Tension control

Reducing transient strains in elastic-strip processes. W. C. Carter.Mar. 84

Testing

Adaptable checkout system fits changing production. Harting & Coulter .....Sept. 126
Aircraft troubles digitally analyzed (WN) .....June 26

Choices in preflight checking of gyros and accelerometers. H. A. Dinter Jr. ....Oct. 75
Obtain process dynamics by pulse testing. J. W. Banham Jr.....Apr. 83
Projections in control equipment: Test equipment.....Jan. 133
Reflected pulses measure stripline impedance. J. R. Pivnichny..Aug. 107
Stress machine grades lumber. Ray Loofburrow .....July 95

Training

Big potential for two-year men, if—(IP) .....Feb. 55
High schools tackle instrument training (NW).....Oct. 20
What's available in digital and logic trainers. M. J. Kashman.....Apr. 73

Transducers (see also Digital transducers)

Ball bearing beefs up flowmeter. H. E. Minkin.....Mar. 105
Calibrating nuclear gages for slurry density. R. A. Denning.....Feb. 79
Choices in preflight checking of gyros and accelerometers. H. A. Dinter Jr. .....Oct. 75
Cryogenic instrumentation. A. W. Angerhofer.....I Oct 67, II Nov. 77
Octane quality comparator directs on-line blender. E. S. Ida & others July 80
Optical systems—answer to precise positioning. E. G. Loewen...Sept. 118
Plane-level gives electrical output. E. L. Bryant.....May 112
Predicting cryogenic thermocouple time constant. V. A. Devita..July 63
Projections in control equipment: Measurement .....Jan. 116
Sensor developments.....Jan. 118
Temperature-stable rate gyro damps magnetically. Alphons Fraenkel .....June 103

Transportation

Automakers focus on optics (WN) Jan. 21
Clear track for on-line railroad controls—New York Central RR (NF) R. L. Aronson.....June 95
Control users pinpoint the potentials: Railroads .....Jan. 87
Merchant marine.....Jan. 88
Air transport.....Jan. 88
Road transportation.....Jan. 89
Fluid amps run locomotive....July 23
Traffic control report: study sees hands-off vehicles; Munich buys signal computer (WN).....June 23
Variable frequency supply powers induction traction motor. Nailen & Jorgensen .....June 101

U

Utilities (see Power generation)

V

Valves

A balance factor for pressure-reducing valves. David Quentzel...May 97
Projections in control equipment: Process control actuators.....Jan. 112
Unusual servovalve has balls for spool. R. D. Gustafson.....Dec. 95

AUTHOR INDEX

Acker, Robert. Designing servos for large-signal stability.....May 71
Agarwal, R. K. Burnt spots boost tape density.....Feb. 97
Aldrich, Keith. The boom is just beginning .....Jan. 67
Angerhofer, A. W. Cryogenic instrumentation.....Oct. 67, II Nov. 77
Arima, John T. Pictorial display streamlines control center..Sept. 142
Aronson, R. L. Clear track for on-line railroad controls.....June 95
Air traffic men compare control notes .....Dec. 85
Scientific and business users close the computer loop.....Sept. 133
Simulators abound at Langley.Oct. 105
Austin, Donald C. Tape cartridge stores and reads.....Feb. 98
Banham, James W. Jr. Obtain process dynamics by pulse testing Apr. 83
Baracz, Andrew J. How to design a compensating bridge.....Mar. 81
Barlow, Derek H. ASCII code—"Please make up your minds," the Europeans say.....June 60
Binary signals locate film frames July 97
Europe: systems grow bigger in lively market.....Jan. 95
Becker, S. M. Signal flow graphs Mar. 89
Belsterling, C. A. & Ka-Cheung Tsui. Analyzing proportional fluid amplifier circuits.....Aug. 87
Bendicsen, B. Simple transducer gives press position readout.....Nov. 117
Bjornsen, Bjorn G. A fluid-amplifier pneumatic controller.....June 88
Blake, Bond M. A feast of control at the three big shows.....Nov. 109
Numerical control in '65 and tomorrow .....Sept. 95
Blickley, G. & F. Masson. Plastic shutters help pinhole spotting Feb. 95
Boswell, F. & P. Cummings. Digital computer tells rallyists go or no go .....Nov. 119
Bryant, E. L. Plane-level gives electrical output.....May 112
Carlberg, E. F. ASCII code—"Yes, now—before a new generation of NC machines are built".June 59
Carlstein, Joseph. How solid state synchros fit servosystems..Sept. 99
Carter, W. C. Reducing transient strains in elastic-strip processes Mar. 84
Castle, A. Accelerometer scribes vector-force signatures.....Mar. 105
Chestnut, Harold. Societies: form and group for progress....Jan. 73
Chudoba, Frank ASCII code—"Not now—let's clean up the existing standards first".....June 59
Clamons, E. H. ASCII: a better NC code for the metalworking industry? Yes.....May 94
Low-order or high-order? Which bit first?.....Aug. 102
Clarke, Arthur F. Jr. Designer's Workbook 4. Fine points about errors in geartrain servos..Aug. 67
Matching motor to load in ac power servos.....Dec. 61
Cochin, Ira. Taking instantaneous errors out of constant-rate servo drives .....Apr. 93
Cope, R. W. A fast and accurate analog multiplier.....July 87
Corbin, H. S. A survey of CRT display consoles.....Dec. 77
Coulter, L. L. & Bruce Harting. Adaptable checkout system fits changing production.....Sept. 126
Culy, G. E. Frequency signals direct contouring machine.....Dec. 93
Cummings, P. & F. Boswell. Digital computer tells rallyists go or no go .....Nov. 119
Cundall, C. M. Backup methods for DDC .....Apr. 98
Cutt, R. A. Proportional control steadies cryosurgical probe temperature .....Mar. 103
de la Cierva, Juan. Rate servo keeps TV picture clear.....May 112
Delmege, A. H. & M. J. Tremblay. Hydraulic digital actuator..Feb. 69
Denning, R. A. Calibrating nuclear gages for slurry density....Feb. 79
Devita, V. A. Predicting cryogenic thermocouple time constant July 63
Dinter, Henry A. Jr. Choices in preflight checking of gyros and accelerometers .....Oct. 75
Dixon, D. C. Finding regulator response from modified Nichols charts .....June 83
Donovan, John C. A transient analysis method for unbalanced bridge circuits.....Apr. 114
How to compensate temperature loops in environmental control Dec. 55
Dozier, J. R. & H. L. Shatto. Resultant computer "moors" ships Apr. 117
Drewry, Hugh S. For successful computing control start simple.Aug. 76
Eppler, W. & N. Szabo. Automatic film reader reports weld flaws May 111
Fairchild, B. T. & L. J. Krovetz. 10 circuits for differentiation on analog computers.....Feb. 65
Fergusson, F. A. Sphere in loop checks flowmeters.....Aug. 110
Fetterman, D. Transparent overlay speeds graph interpolation.Nov. 117
Fielder, L. H. & others. Controlling megawatts in steelmaking..June 68
Fraenkel, Alphons. Temperature-stable rate gyro damps magnetically .....June 103
Gawlowicz, D. J. & others. Compensating pulse-data servos...June 61
Gorbatenko, George G. Posicast control by delayed gain.....Feb. 74
Gould, C. H. What's new in control standards .....Aug. 83
Grew, R. J. M. & F. Waldman. Analog computer cuts billets...July 75
Gustafson, R. D. Unusual servovalve has balls for spool.....Dec. 95
Haalman, A. Adjusting controllers for a deadtime process.....July 71
Pulsation errors in turbine flowmeters .....May 89
Hagel, Joseph, Weight-balance servo lowers load into a hole....Oct. 111
Harris, Everett L. Jr. How to design water-cooled heatsinks for SCR's .....Apr. 105
Harrison, H. L. & W. J. Raymond. Check stability of third-order

systems ..... Aug. 94
Harting, Bruce & L. L. Coulter. Adaptable checkout system fits changing production ..... Sept. 126
Heumann, Gerhart W. What you should know about IEC 158-1 Feb. 72
Hoffman, C. H. How to check linear systems stability.
II. Locating the roots by algebra ..... Feb. 84
III. Locating the roots graphically ..... June 71
IV. Determining relative stability ..... Oct. 85
Hoffman, R. A. & others. Octane quality comparator directs on-line blender ..... July 80
Holmes, James F. Specifying a message-switching computer ... Feb. 89
Houpis, C. H. Parameter sensitivity by root locus ..... Apr. 111
Hubbard, K. H. & H. W. Mergler. Digital control for the single loop ..... Feb. 61
Hubbarth, W. F. Shrinking the man-computer interface ..... Aug. 63
Ida, E. S. & others. Octane quality comparator directs on-line blender ..... July 80
Inoue, Kuniko & Kazuto Togino. Cascaded piston units form universal fluid logic element .. May 78
Ito, Jimichi & Kazuto Togino. Piston fluid logic sequences gas dispensing ..... Sept. 139
Johnson, R. M. Artificial feel for servo-boosted controls .... Mar. 67
Jones, G. A. & R. E. Vahouny. Finding transient descriptors graphically ..... 1 Oct. 97, 2 Nov. 99
Jorgensen, M. V. & R. L. Nailen. Variable frequency supply powers traction motor ..... June 101
Kashman, M. J. What's available in digital and logic trainers ... Apr. 73
Kelly, J. D. Level gage senses with binary connected coils .... Oct. 109
Kershow, W. V. Adaptive control by plant identification ..... Sept. 103
Kielpinski, Ralph C. Tape driven photohead makes PC-board plates ..... June 99
Kintner, P. M. Translating logic to circuits ..... Nov. 86
Kramer, Charles E. Silly putty absorbs heartbeats ..... Feb. 98
Krovetz, L. J. & B. T. Fairchild. 10 circuits for differentiation on analog computers ..... Feb. 65
Kuschnerus, Hans J. Tape-driven display shows order-picker the way May 109
Lang, Charles W. Use multiple synchros in two-speed systems. Oct. 100
Lawrence, L. A. J. High-security control through redundant channels ..... Mar. 74
Lee, Bernard W. Versatile logic module ..... Oct. 92
Loewen, Erwin G. Optical systems—answer to precise positioning Sept. 118
Loofburrow, Ray. Stress machine grades lumber ..... July 95
Loos, C. H. Make the most of time-proportional control ..... May 65
Majewski, E. H. Second-order response ..... Feb. 71
Mamon, Michel. 1 SCR converts 3 phase to DC ..... June 79
Mamzic, Charles L. Fast simultaneous bumpless transfer (interview) ..... Aug. 97
Marshall, J. & others. Designer's Workbook 3. Positioning with hydraulic cylinders ..... Mar. 91
Masson, F. & G. Blickley. Plastic shutters help pinhole spotting Feb. 95
Mason, H. L. Standards. Still a continuing project ..... Jan. 74
McConnell, G. & others. Designer's Workbook 3. Positioning with hydraulic cylinders ..... Mar. 91
McDermott, J. R. Summing network design using conductance method ..... May 102
McLay, J. R. Clip-card sets curtain contour ..... Aug. 110
Melcher, H. J. & D. D. Otten. Modulating bang-bang attitude controls ..... Nov. 73
Mergler, H. W. & K. H. Hubbard. Digital control for the single loop ..... Feb. 61
Minkin, H. E. Ball bearing beefs up flowmeter ..... Mar. 105
Moore, James W. Equivalent routh array accelerates high-order analysis ..... July 85
Morris, W. E. & others. Octane quality comparator directs on-line blender ..... July 80
Nailen, R. L. & M. V. Jorgensen. Variable frequency supply powers traction motor ..... June 101
Najjar, H. F. Interfacing data modems and processors .. Nov. 103
Nightingale, J. M. Practical optimizing system ..... Nov. 93
Nikiforuk, P. N. & D. R. Westlund. Using dual-locus diagrams in systems synthesis ..... Dec. 73
Nitchie, C. D. & L. K. Seith. Integrated pulses show motor speed fluctuations ..... Oct. 111
Orner, P. & others. Fluidic digital servo ..... Dec. 49
Otten, D. D. & H. J. Melcher. Modulating bang-bang attitude controls ..... Nov. 73
Peoples, J. A. & W. W. Scott. Photoelastic effect shows fluid device performance ..... July 98
Pivnichny, J. R. Reflected pulses measure line impedance ... Aug. 107
Prochaska, N. Half-adder-subtractor updates delay line ..... July 97
Quentzel, David. A balance factor for pressure-reducing valves May 97
Ralph, J. Hot, concentrated solutions pose density sensing problem Nov. 115
Randall, R. A. Gimballed switch signals fractional g's ..... Apr. 119
Raymond, W. J. & H. L. Harrison. Check stability of third-order systems ..... Aug. 94
Rea, Donald E. Field-effect transistors—simpler switches for analog signals ..... July 66
Rehder, M. Light rays track 'copter blades ..... Sept. 141
Rhoades, John M. Mating machine tools and hydraulic servos—it's a 2-way street ..... Apr. 89
Ryan, Frank M. Instrument maintenance methods—a roundup of user approaches ..... Sept. 111
DDC with an analog look ... Dec. 68
Process control practices excite interest ..... Mar. 97
Sarafin, Eugene E. Information protection: Why? How? ..... May 105
Scott, W. W. & J. A. Peoples. Photoelastic effect shows fluid device performance ..... July 98
Seith, L. K. & C. D. Nitchie. Integrated pulses show motor speed fluctuations ..... Oct. 111
Shatto, H. L. & J. R. Dozier. Resultant computer "moors" ships Apr. 117
Silverstein, J. P. & P. L. Sursi. Damping ratio curves ..... Sept. 131
Skinner, Robert L. Syringe controller times injection ..... Aug. 109
Stadler, G. Off-line gaging sets tool's position ..... Mar. 106
Staffin, Robert. 6 ways to measure phase angle ..... Oct. 78
Straub, Henrik H. Fluid amplifier helps patients breathe .... Apr. 120
Stromberg, R. P. Surface tension closes weightlessness switch Dec. 95
Sursi, P. L. & J. P. Silverstein. Damping ratio curves in the z-plane Sept. 131
Szabo, N. & W. Eppler. Automatic film reader reports flaws ... May 111
Taft, C. K. & others. Compensating pulse-data servos ..... June 61
Taft, C. K. & others. Fluidic digital servo ..... Dec. 49
Tippett, J. & others. Controlling megawatts in steelmaking .. June 68
Togino, Kazuto. Japan: a control youngster maturing fast .... Jan. 99
Togino, Kazuto & Jimichi Ito. Piston fluid logic sequences gas dispensing ..... Sept. 139
Togino, Kazuto & Kuniko Inoue. Cascaded piston units form universal fluid logic element .. May 78
Tremblay, M. J. & A. H. Delmege. Hydraulic digital actuator . Feb. 69
Truxal, John G. Education: control has its impact ..... Jan. 71
Tsui, Ka-Cheung & C. A. Belsterling. Analyzing proportional fluid amplifier circuits ..... Aug. 87
Turnquist, R. O. & others. Fluidic digital servo ..... Dec. 49
Vahouny, R. E. & G. A. Jones. Finding transient descriptors graphically ..... 1 Oct. 97, 2 Nov. 99
Waldman, F. & R. J. M. Grew. Analog computer cuts billets .. July 75
Wentworth, C. & others. Designer's Workbook 3. Positioning with Hydraulic cylinders. J. Marshall & others ..... Mar. 91
Werme, J. V. "Name communication" speeds plant data display Dec. 73
Westlund, D. R. and P. N. Nikiforuk. Using dual-locus diagrams in systems synthesis ..... Dec. 73
Whitwell, A. & others. Controlling megawatts in steelmaking .. June 68
Wijnschenk, M. J. & others. Compensating pulse-data servos .... June 61
Wildhack, William A. Measurement: R&D looks to future ..... Jan. 75
Wilson, J. N. & others. Fluidic digital servo ..... Dec. 49